

Name: _____

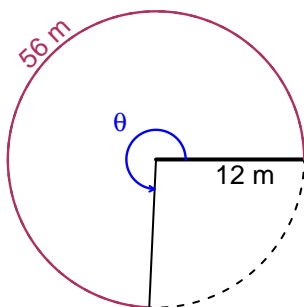
Date: _____

Trig Final (SLTN v690)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 12 meters. The arc length is 56 meters. What is the angle measure in radians?

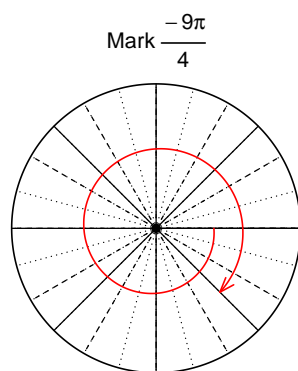


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

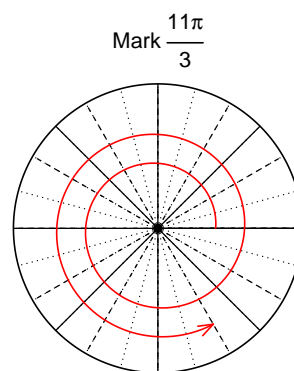
$$\theta = 4.667 \text{ radians.}$$

Question 2

Consider angles $-\frac{9\pi}{4}$ and $\frac{11\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(-\frac{9\pi}{4}\right)$ and $\cos\left(\frac{11\pi}{3}\right)$ by using a unit circle (provided separately).

Find $\sin(-9\pi/4)$

$$\sin(-9\pi/4) = -\frac{\sqrt{2}}{2}$$

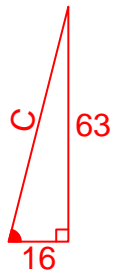
Find $\cos(11\pi/3)$

$$\cos(11\pi/3) = \frac{1}{2}$$

Question 3

If $\tan(\theta) = \frac{-63}{16}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

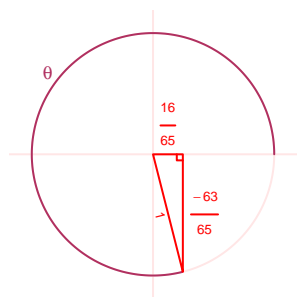
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$\begin{aligned}16^2 + 63^2 &= C^2 \\ C &= \sqrt{16^2 + 63^2} \\ C &= 65\end{aligned}$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{16}{65}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 8.93$ meters, an amplitude of 6.96 meters, and a frequency of 4.25 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -6.96 \cos(2\pi 4.25t) + 8.93$$

or

$$y = -6.96 \cos(8.5\pi t) + 8.93$$

or

$$y = -6.96 \cos(26.7t) + 8.93$$